

SMOKY HILL/SALINE RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Water Body: Cedar Bluff Lake
Water Quality Impairment: Eutrophication

Subbasin: Upper Smoky Hill

Counties: Gove, Greeley, Lane, Logan, Ness, Scott, Sherman, Thomas, Trego, Wallace, and Wichita

HUC 8:	HUC 11 (14):	010 (090, 100, 110) (Figure 1)
10260001		020 (010, 020, 030) 030 (010, 020, 030, 040) 040 (010, 020, 030, 040, 050, 060)
10260002		010 (060, 070, 080, 090, 100, 110, 120) 030 (010, 020, 030, 040, 050, 060)
10260003		010 (010, 020, 030, 040, 050, 060) 020 (010, 020, 030, 040, 050, 060, 070, 080, 090) 030 (010, 020, 030) 040 (010, 020, 030, 040, 050, 060, 070, 080) 050 (010, 020, 030, 040, 050, 060, 070, 080)
10260004		010 (040, 050, 060, 070, 080) 020 (030, 040, 050, 060, 070, 080, 090) 030 (010, 020, 030, 040) 040 (010, 020, 030, 040) 050 (010, 020, 030, 040, 050, 060, 070, 080, 090)
10260005		010 (010, 020, 030, 040, 050, 060) 020 (010, 020, 030, 040, 050, 060, 070)

Ecoregion: Western High Plains, Moderate Relief Rangeland (25c)
Western High Plains, Flat to Rolling Cropland (25d)
Central Great Plains, Rolling Plains and Breaks (27b)

Drainage Area: Approximately 4,305 square miles.

Conservation Pool: Area = 6,618 acres
Watershed Area: Lake Surface Area = 416:1
Maximum Depth = 19.0 meters (62.3 feet)
Mean Depth = 7.8 meters (25.6 feet)
Retention Time = 1.36 years (16.3 months)

Designated Uses: Primary and Secondary Contact Recreation; Expected Aquatic Life Support; Food Procurement; Irrigation

Authority: Federal (U.S. Bureau of Reclamation) and State (Kansas Dept. of Wildlife and Parks)

2002 303(d) Listing: Smoky Hill/Saline River Basin Lakes

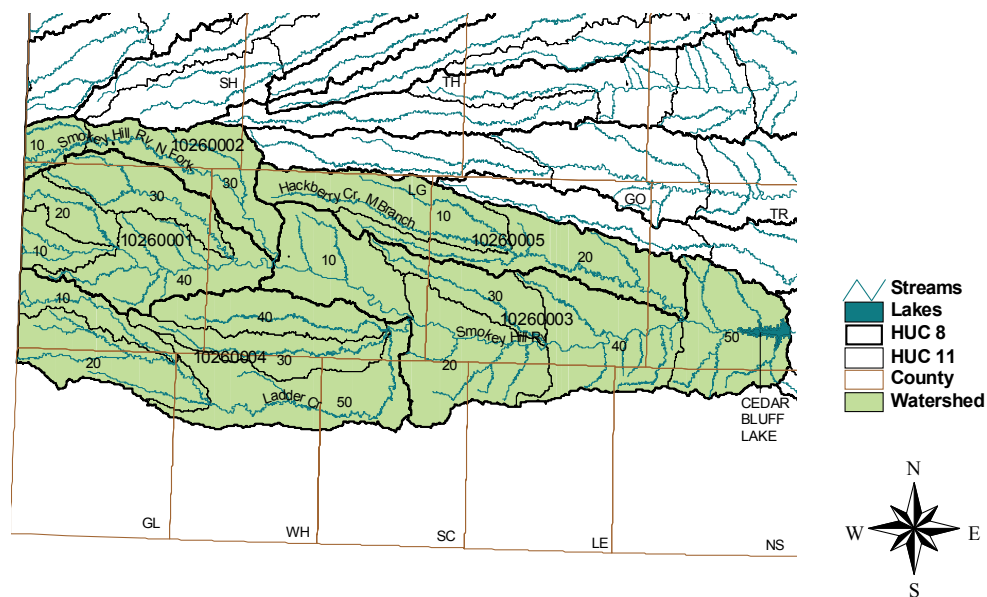
Impaired Use: All uses are impaired to a degree by eutrophication

Water Quality Standard: Nutrients - Narrative: The introduction of plant nutrients into streams, lakes, or wetlands from artificial sources shall be controlled to prevent the accelerated succession or replacement of aquatic biota or the production of undesirable quantities or kinds of aquatic life. (KAR 28-16-28e(c)(2)(B)).

The introduction of plant nutrients into surface waters designated for primary or secondary contact recreational use shall be controlled to prevent the development of objectionable concentrations of algae or algal by-products or nuisance growths of submersed, floating, or emergent aquatic vegetation. (KAR 28-16-28e(c)(7)(A)).

Figure 1

Cedar Bluff Lake HUC 8 and HUC 11



2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Eutrophication: Slightly Eutrophic, Trophic State Index = 50.34

Lake Chemistry Monitoring Sites: Station 013001 in Cedar Bluff Lake (Figure 2).

Period of Record Used: Five surveys during 1988 - 2000

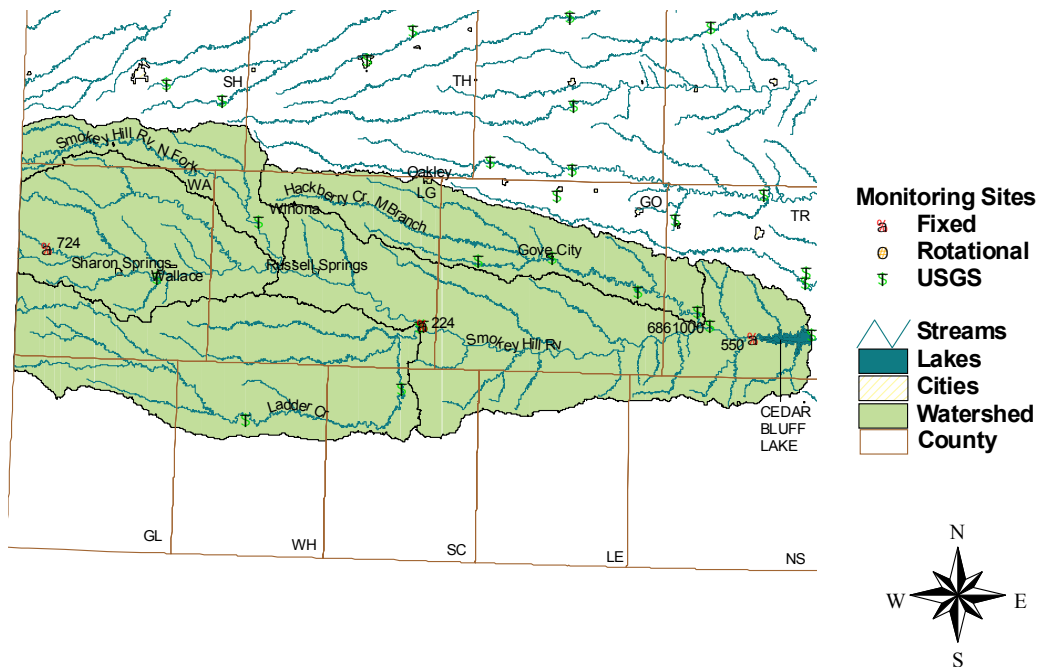
Stream Chemistry Monitoring Site: Station 550 near Trego Center (Smoky Hill River)

Period of Record Used: 1990 - 2002

Flow Record: Smoky Hill River near Arnold, KS (USGS Gage 06861000)

Figure 2

Cedar Bluff Lake TMDL Reference Map



Current Condition: In 1991, the water level in Cedar Bluff Lake was down 43 feet. The nutrients were concentrated; the average total phosphorus concentration was $87.5 \mu\text{g/L}$. In response, the chlorophyll a concentrations were elevated averaging $58.9 \mu\text{g/L}$. (Appendix A). This relates to a Trophic State Index of 70.55, indicating Hypereutrophic conditions. The turbidity increased with an average concentration of 17.7 formazin turbidity units, and the Secchi Disc depth was 0.4 meters.

The flood of 1993 replenished the lake (Appendix C). According to the load duration curve in Appendix D, some phosphorus does enter the watershed during high flow events. However, overall, the flood diluted the phosphorus concentration entering the lake. Since 1993, the water quality has been ideal. The water clarity has improved with a Secchi Disc depth of 1.8 meters and turbidity of 3.1 formazin turbidity units. The average concentrations of phosphorus and chlorophyll a are 44 $\mu\text{g/L}$ and 7.5 $\mu\text{g/L}$ respectively. Cedar Bluff Lake is now slightly eutrophic and attains its intended uses. The lake is limited primarily due to zooplankton grazing (Appendix B). The chlorophyll a to total phosphorus yield is low.

The Trophic State Index is derived from the chlorophyll a concentration. Trophic state assessments of potential algal productivity were made based on chlorophyll a concentrations, nutrient levels and values of the Carlson Trophic State Index (TSI). Generally, some degree of eutrophic conditions is seen with chlorophyll a concentrations over 7 $\mu\text{g/l}$ and hypereutrophy occurs at levels over 30 $\mu\text{g/l}$. The Carlson TSI, derives from the chlorophyll concentrations and scales the trophic state as follows:

- | | |
|-----------------------|-----------------|
| 1. Oligotrophic | TSI < 40 |
| 2. Mesotrophic | TSI: 40 - 49.99 |
| 3. Slightly Eutrophic | TSI: 50 - 54.99 |
| 4. Fully Eutrophic | TSI: 55 - 59.99 |
| 5. Very Eutrophic | TSI: 60 - 63.99 |
| 6. Hypereutrophic | TSI: ≥ 64 |

Interim Endpoints of Water Quality (Implied Load Capacity) at Cedar Bluff Lake over 2008 - 2012:

To ensure that Cedar Bluff Lake is protected, the desired endpoint will be to maintain average, summer chlorophyll a concentrations at or below 7.5 $\mu\text{g/L}$. To maintain the clarity of the water, the desired Secchi disc depth endpoint will be summer average readings greater than 1.8 m in the main body of the lake near the dam.

Current Condition and Reductions for Cedar Bluff Lake

Parameter	Current Condition	TMDL	Percent Reduction
Total Phosphorus Load (lb/year)	320,052	320,052	0 %
Total Phosphorus Concentration ($\mu\text{g/L}$)	44	44	0 %
Chlorophyll a ($\mu\text{g/L}$)	7.5	7.5	0 %
Secchi Disc Depth (meter)	1.8	1.8	0 %

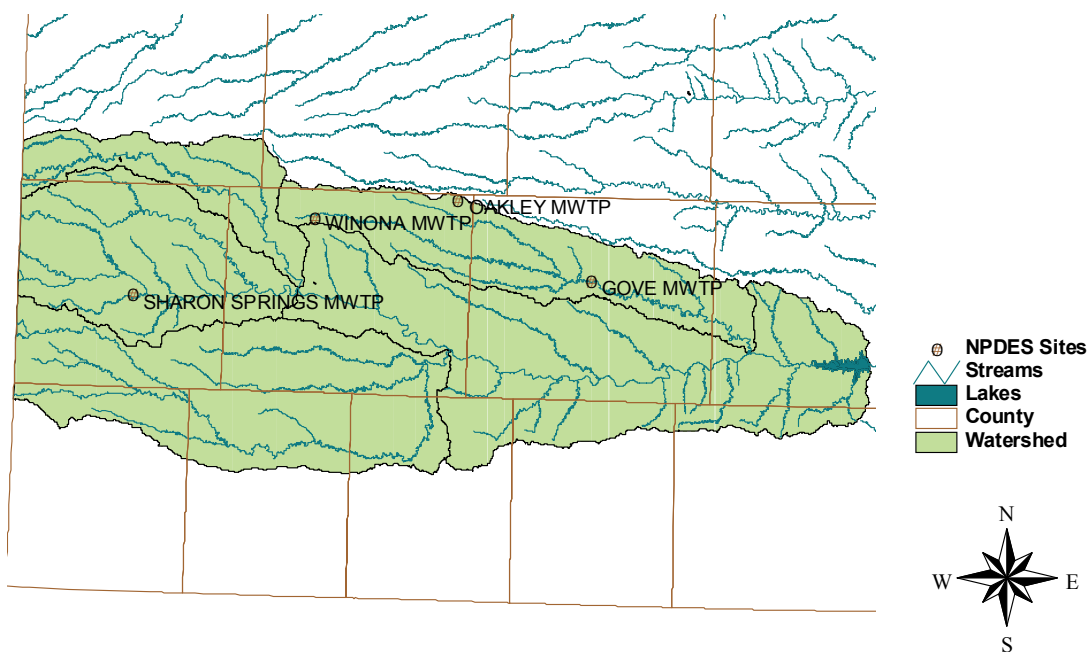
3. SOURCE INVENTORY AND ASSESSMENT

NPDES: Four permitted waste treatment facilities are located within the watershed (Figure 3). Three are non-overflowing lagoons that are prohibited from discharging and may contribute a

nutrient load under extreme precipitation events (flow durations exceeded under 5 percent of the time). Such events would not occur at a frequency or for a duration sufficient to cause an impairment in the watershed. According to projections of future water use and resulting wastewater, the non-overflowing lagoons look to have sufficient treatment capacity available.

Figure 3

Cedar Bluff Lake NPDES Sites



The point source contribution is derived from monitoring data from the waste treatment plants and other point source pollution contributors. When effluent discharge data is not available, the following concentrations are used to calculate the waste load allocations for waste treatment plant lagoons and municipal mechanical plants:

Average Concentration in Municipal Facilities that Meet Baseline Design

Facility Type	Total Phosphorus
Waste Treatment Plant Lagoon	2.0 mg/L
Mechanical Plant – Trickling Filter	3.5 mg/L
Mechanical Plant – Activated Sludge only fully nitrify	3.5 mg/L
Mechanical Plant – Activated Sludge fully nitrify and de-nitrify	3.5 mg/L

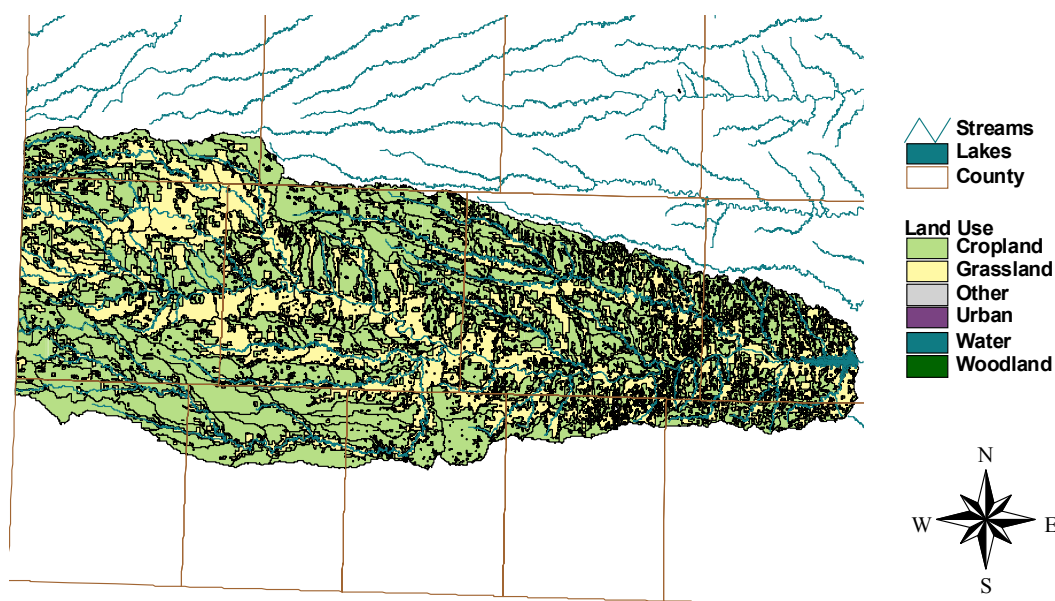
The Oakley MWTP discharges approximately 0.2 MGD based on effluent discharge reports from 2002. At the current permitted design capacity of 0.4 MGD, the Oakley MWTP is allowed to discharge 11.7 pounds per day of total phosphorus.

Waste Treatment Plants in the Cedar Bluff Lake Watershed

Kansas Permit Number	Name	Type	Design Capacity (MGD)	Wasteload Allocation
M-SH11-NO01	Gove MWTP	Two-cell Lagoon	Non-overflowing	0 lb/day
M-SH29-OO01	Oakley MWTP	Trickling Filter	0.4	11.7 lb/day
M-SH35-NO01	Sharon Springs MWTP	Two-cell Lagoon	Non-overflowing	0 lb/day
M-SH41-NO01	Winona MWTP	Three-cell Lagoon	Non-overflowing	0 lb/day

Figure 4

Cedar Bluff Lake Land Use



Land Use: The watershed around Cedar Bluff Lake has a moderate potential for nonpoint source pollutants. An annual phosphorus load of 320,052 pounds per year is necessary to correspond to the concentrations seen in the lake.

One source of phosphorus within Cedar Bluff Lake is probably runoff from agricultural lands where phosphorus has been applied. Land use coverage analysis indicates that 59.2% of the watershed is cropland (Figure 4).

Phosphorus from animal waste is a potential contributing factor. Animal waste, from livestock waste management systems, may add to the phosphorus load going into the lake (Figure 5). However, given the controls for the systems, animal waste coming from grazing areas is a more likely contributor. Forty percent of land around the lake is grassland. There are 63 beef, 15 swine, five dairy, and two sheep animal feeding operations in the watershed. Thirty-one of these facilities are NPDES permitted, non-discharging facilities with 388,138 animal units (active: 375,139; inactive: 12,999). All permitted livestock facilities have waste management systems designed to minimize runoff entering their operations or detaining runoff emanating from their areas. Such systems are designed to retain the 25 year, 24 hour rainfall/runoff event, as well as an anticipated two weeks of normal wastewater from their operations. Such a rainfall event typically coincides with stream flows which are exceeded 1-5 percent of the time. Therefore, events of this type, infrequent and of short duration, are not likely to add to chronic impairment of the designated uses of the waters in this watershed. Requirements for maintaining the water level of the waste lagoons a certain distance below the lagoon berms ensure retention of the runoff from the intense, local storms events. In Gove County, where many of the facilities are relatively close to the river, such an event would generate 4.6 inches of rain, yielding 3.5 to 4.3 inches of runoff in a day. Permit compliance data was examined, and no evidence of spills was detected. Potential animal units for all facilities in the watershed total 413,877 (active: 394,456 animal units; inactive: 19,421 animal units). The actual number of animal units on site is variable, but typically less than potential numbers.

Permitted Livestock Waste Management Systems in the Watershed

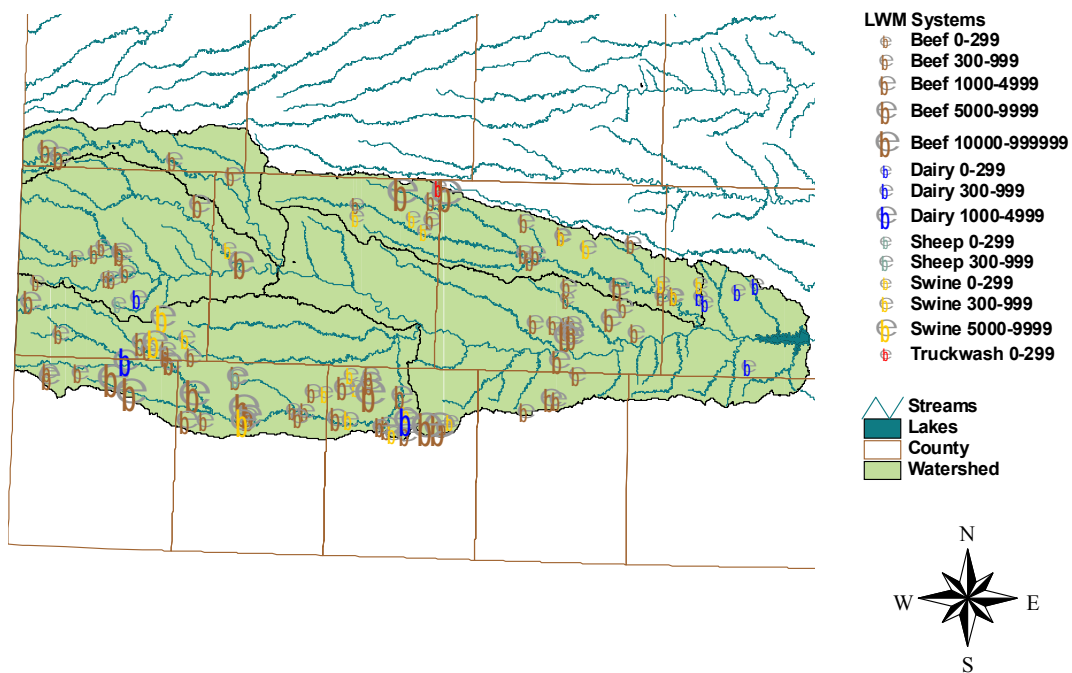
Kansas Permit Number	Livestock Waste Management System	Wasteload Allocation
A-UASC-C018	Stampede Feeders	0 lb/day
A-SHGL-C001	Ox Town Cattle Feeders, Inc.	0 lb/day
A-SHGL-C002	Young Cattle Company	0 lb/day
A-SHGL-CA01	Herl, Frank And Son	0 lb/day
A-SHGL-D001	Ladder Creek Dairy	0 lb/day
A-SHGO-C001	* Evans Cattle, Inc.	0 lb/day
A-SHGO-C002	C.y. Cattle Company	(Closed) 0 lb/day
A-SHGO-C003	Pioneer Feedyard, Inc.	0 lb/day
A-SHGO-C004	Albin Feedlot	0 lb/day
A-SHGO-C006	* Coberly, Glenn Feedlot	0 lb/day
A-SHGO-C008	Cat House Feeders	0 lb/day
A-SHGO-C010	Leighton, Robert L.	0 lb/day
A-SHLG-C001	South Central Feeders, Inc.	0 lb/day
A-SHLG-C002	* Bertrand Cattle	0 lb/day
A-SHSC-C001	Brookover Cattle Company, Inc.	0 lb/day
A-SHSC-C005	Royal Beef, Inc.	0 lb/day
A-SHSC-C006	Owen Unruh Cattle	0 lb/day
A-SHSC-C007	Decker Brothers Livestock	0 lb/day
A-SHSC-C008	Wiechman Feedyard, L.p.	0 lb/day
A-SHSC-C009	Griffith Ranch	0 lb/day
A-SHSC-C010	Nightengale Cattle Co.	0 lb/day

A-SHWA-C002	Howard C. Wilson Trust	0 lb/day
A-SHWA-C003	Smoky River Cattle Co	0 lb/day
A-SHWA-C004	Jim Harrison Ranch	0 lb/day
A-SHWA-C005	Purvis Feedlot	0 lb/day
A-SHWH-C003	* Caprock, Inc.	0 lb/day
A-SHWH-C004	Kan Sun Beef, Inc.	0 lb/day
A-SHWH-C006	Wedel Feedlot	0 lb/day
A-SHWH-C007	Csa Cattle Co.	0 lb/day
A-SHWH-CA01	Rafter Ranch	(Inactive) 0 lb/day
300	Maple Creek Farms, Llc - Coolidge S	0 lb/day

* The facility is not in compliance with the existing permit. Corrective actions are being taken by the KDHE Livestock Management Program.

Figure 5

Cedar Bluff Lake Livestock Waste Management Systems



All of the towns in the watershed anticipate a population decline except for Oakley. Less than one percent of the watershed is urban; stormwater runoff and urban fertilizer applications are a minor contributing factor. The average population density in the watershed is 1.7 people per square mile.

Population Trends for Towns in the Watershed

Town	% Change from 2000 to 2020
Gove City	-9.2%
Oakley	+1.3%
Ransom	-2.0%
Russell Springs	-19.2%
Sharon Springs	-4.2%
Utica	-5.5%
Wallace	-6.9%
Winona	-4.2%

A potential source is septic systems located around the lake. Failing septic systems can be a significant source of nutrients. The Trego County has 634 septic systems, accounting for 34% of the sewage systems present in the county.

Contributing Runoff: The watershed's average soil permeability is 1.7 inches/hour according to NRCS STATSGO database. About 77.9% of the watershed produces runoff even under relatively low (1.5"/hr) potential runoff conditions. Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. As the watersheds' soil profiles become saturated, excess overland flow is produced. Generally, storms producing less than 0.5"/hr of rain will generate runoff from 5.3% of this watershed, chiefly along the stream channels.

Background Levels: The atmospheric phosphorus and geological formations (i.e., soil and bedrock) may contribute to phosphorus loads. Nutrients from wildlife waste is another contributing factor.

4. ALLOCATION OF POLLUTANT REDUCTION RESPONSIBILITY

Total Phosphorus is allocated under this TMDL, because maintaining the current phosphorus load will have a large effect on the managing the algal community. The Load Capacity is 320,052 pounds per year of total phosphorus and was calculated using the CNET model. More detailed assessment of sources and confirmation of the trophic state of the lake must be completed before detailed allocations can be made. The general inventory of sources within the drainage does provide some guidance as to areas of load reduction.

Point Sources: There are three non-overflowing and one discharging waste treatment plants in the watershed. Ongoing inspections and monitoring of these NPDES sites will be made to ascertain the contributions that have been made by the source. These Waste Treatment Plants should comply with any future permit limits. The Wasteload Allocation for the Oakley MWTP

should be at 4,266 pounds of total phosphorus per year. As previously noted in the inventory and assessment section, sources such as non-discharging permitted municipal facilities and livestock waste management systems located within the watershed do not discharge with sufficient frequency or duration to add to an impairment in the lake.

Nonpoint Sources: Nonpoint source pollutants contribute nutrients to the Cedar Bluff Lake watershed. Background levels may be attributed to wildlife and geological sources. The assessment suggests that cropland and animal waste contribute to the total phosphorus concentrations in the lake. Generally a Load Allocation of 283,781 pounds of total phosphorus per year.

Defined Margin of Safety: The margin of safety provides some hedge against the uncertainty of variable annual total phosphorus load and the chlorophyll a endpoint. Therefore, the margin of safety will be 32,005 pounds per year of total phosphorus taken from the load capacity subtracted to compensate for the lack of knowledge about the relationship between the allocated loadings and the resulting water quality.

State Water Plan Implementation Priority: Because Cedar Bluff Lake has a large regional benefit for recreation, this TMDL will be a Medium Priority for implementation.

Unified Watershed Assessment Priority Ranking: Cedar Bluff Lake lies within the Upper Smoky Hill (HUC 8: 10260003) with a priority ranking of 66 (Low Priority for restoration).

Priority HUC 11s: The HUC 11 (10260003050) is adjacent to Cedar Bluff Lake, and thus the Upper Smoky Hill subwatershed should take priority.

5. IMPLEMENTATION

Desired Implementation Activities

There is an excellent potential that agricultural best management practices will allow full protection of Cedar Bluff Lake. Some of the recommended agricultural practices are as follows:

1. Implement soil sampling to recommend appropriate fertilizer applications on cropland.
2. Maintain conservation tillage and contour farming to minimize cropland erosion.
3. Install grass buffer strips along streams.
4. Reduce activities within riparian areas.
5. Implement nutrient management plans to manage manure application to land.

Implementation Programs Guidance

Fisheries Management - KDWP

- a. Assist evaluation in-lake or near-lake potential sources of nutrients to lake.
- b. Advise county on applicable lake management techniques which may reduce nutrient loading and cycling in lake.

Nonpoint Source Pollution Technical Assistance - KDHE

- a. Support Section 319 demonstration projects for reduction of sediment runoff from agricultural activities as well as nutrient management.
- b. Provide technical assistance on practices geared to establishment of vegetative buffer strips.
- c. Provide technical assistance on nutrient management in vicinity of streams.
- d. Create a Watershed Restoration and Protection Strategy for HUC 10260001, 10260002, 10260003, 10260004, and 10260005

Livestock Waste Management - KDHE

- a. Take corrective actions to ensure that facilities comply with existing permits.

Water Resource Cost Share Nonpoint Source Pollution Control Program - SCC

- a. Apply conservation farming practices, including terraces and waterways, sediment control basins, and constructed wetlands.
- b. Provide sediment control practices to minimize erosion and sediment and nutrient transport.

Riparian Protection Program - SCC

- a. Establish or reestablish natural riparian systems, including vegetative filter strips and streambank vegetation.
- b. Develop riparian restoration projects.
- c. Promote wetland construction to assimilate nutrient loadings.

Buffer Initiative Program - SCC

- a. Install grass buffer strips near streams.
- b. Leverage Conservation Reserve Enhancement Program to hold riparian land out of production.

Extension Outreach and Technical Assistance - Kansas State University

- a. Educate agricultural producers on sediment, nutrient, and pasture management.
- b. Educate livestock producers on livestock waste management and manure applications and nutrient management planning.
- c. Provide technical assistance on livestock waste management systems and nutrient management plans.
- d. Provide technical assistance on buffer strip design and minimizing cropland runoff.
- e. Encourage annual soil testing to determine capacity of field to hold nutrients.

Time Frame for Implementation: Water quality improvement activities are encouraged at the local level prior to 2008. Funding for installing lake protection practices should be allocated within the lake drainage after the year 2008. Evaluation of nutrient sources to lake and identification of potential management techniques should occur prior to 2008.

Targeted Participants: Primary participants for implementation will be agricultural producers within the drainage of the lake. Initial work in 2008 should include local assessments by conservation district personnel and county extension agents to locate within the lake drainage:

1. Total row crop acreage
2. Cultivation alongside lake
3. Drainage alongside or through animal feeding lots
4. Livestock use of riparian areas
5. Fields with manure applications

Milestone for 2008: The year 2008 marks the midpoint of the ten-year implementation window for the watershed. At that point in time, sampled data from Cedar Bluff Lake should indicate evidence of no increase in phosphorus levels in the conservation pool elevations relative to the conditions seen over 1994-2000.

Delivery Agents: The primary delivery agents for program participation will be the Kansas Department of Wildlife and Parks. Producer outreach and awareness will be delivered by Kansas State Extension.

Reasonable Assurances:

Authorities: The following authorities may be used to direct activities in the watershed to reduce pollutants.

1. K.S.A. 65-171d empowers the Secretary of KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through required treatment of sewage and established water quality standards and to require permits by persons having a potential to discharge pollutants into the waters of the state.
2. K.S.A. 2-1915 empowers the State Conservation Commission to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.
3. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control nonpoint source pollution.
4. K.S.A. 82a-901, et seq. empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.
5. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*.
6. The *Kansas Water Plan* and the Smoky Hill/Saline Basin Plan provide the guidance to state agencies to coordinate programs intent on protecting water quality and to target those programs to geographic areas of the state for high priority in implementation.

Funding: The State Water Plan Fund annually generates \$16-18 million and is the primary funding mechanism for implementing water quality protection and pollutant reduction activities in the state through the *Kansas Water Plan*. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watersheds and water resources of highest priority. Typically, the state allocates at least 50% of the fund to programs supporting water quality protection. This watershed and its TMDL are a Medium Priority consideration.

Effectiveness: Nutrient control has been proven effective through conservation tillage, contour farming and use of grass waterways and buffer strips. The key to success will be widespread utilization of conservation farming and installation of buffer strips within the watersheds cited in this TMDL.

6. MONITORING

Additional data, to further determine source loading and mean summer lake trophic condition, would be of value prior to 2008. Further sampling and evaluation should occur once before 2008 and once between 2008 and 2012. Some monitoring of tributary levels of nutrients will help direct abatement efforts toward major contributors.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the Smoky Hill/Saline Basin were held January 7 and March 5, 2003 in Hays. An active Internet Web site was established at <http://www.kdhe.state.ks.us/tmdl/> to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Smoky Hill/Saline Basin.

Public Hearing: A Public Hearing on the TMDLs of the Smoky Hill/Saline Basin was held in Hays on June 2, 2003.

Basin Advisory Committee: The Smoky Hill/Saline Basin Advisory Committee met to discuss the TMDLs in the basin on October 3, 2002, January 7, March 5, and June 2, 2003.

Milestone Evaluation: In 2008, evaluation will be made as to the degree of implementation which has occurred within the watershed and current condition of Cedar Bluff Lake. Subsequent decisions will be made regarding the implementation approach and follow up of additional implementation in the watershed.

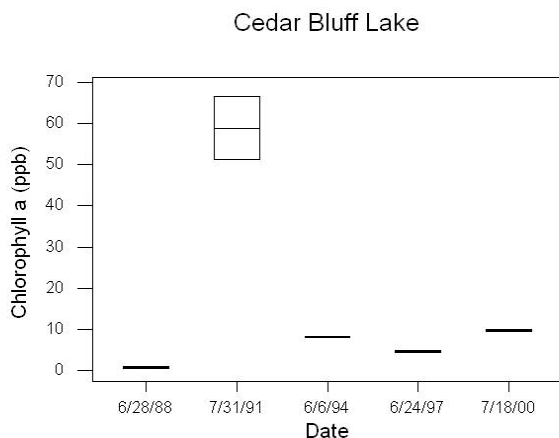
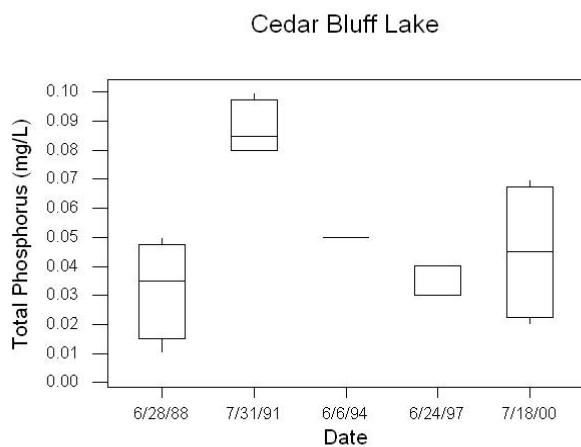
Consideration for 303(d) Delisting: The lake will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2008-2012. Therefore, the decision for delisting will come about in the preparation of the 2012 303(d) list. Should modifications be made to the applicable water quality criteria during the ten-year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

Incorporation into Continuing Planning Process, Water Quality Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2004 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process for Fiscal Years 2004-2008.

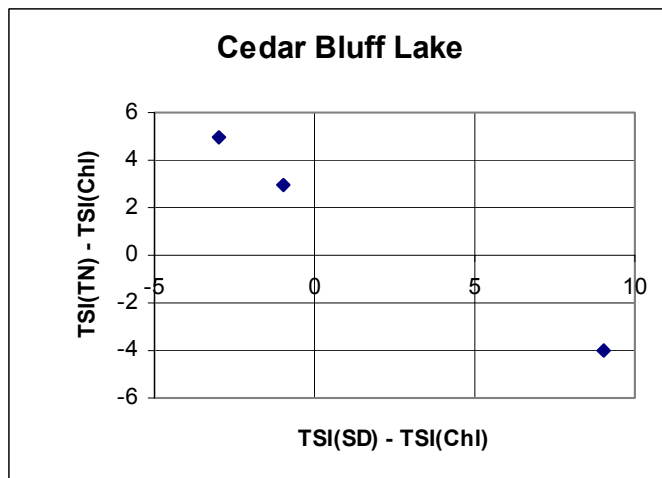
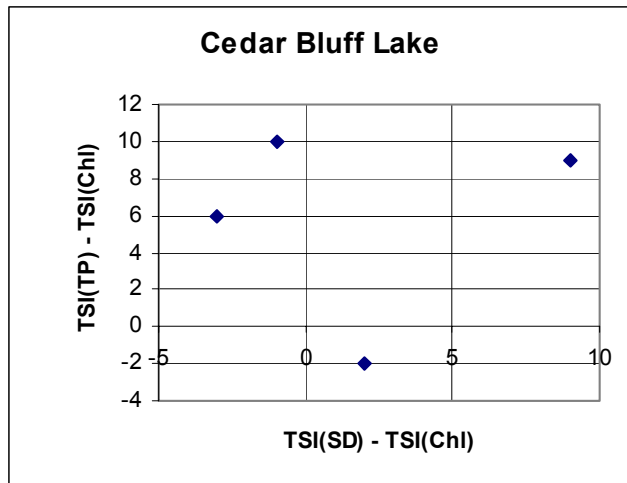
Bibliography

Liscek, Bonnie C. Methodology Used in Kansas Lake TMDLs [web page] Jul. 2001;
<http://www.kdhe.state.ks.us/tmdl/eutro.htm> [Accessed 30 September 2002].

Appendix A - Boxplots

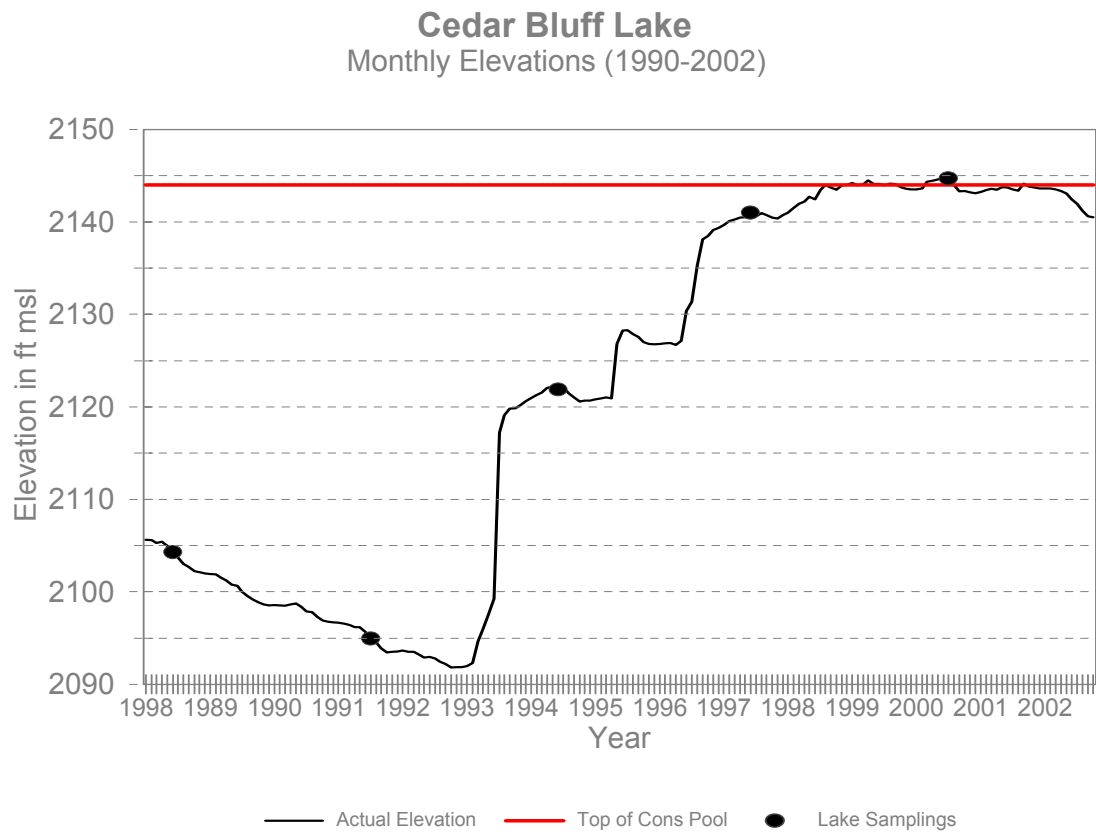


Appendix B - Trophic State Index Plots

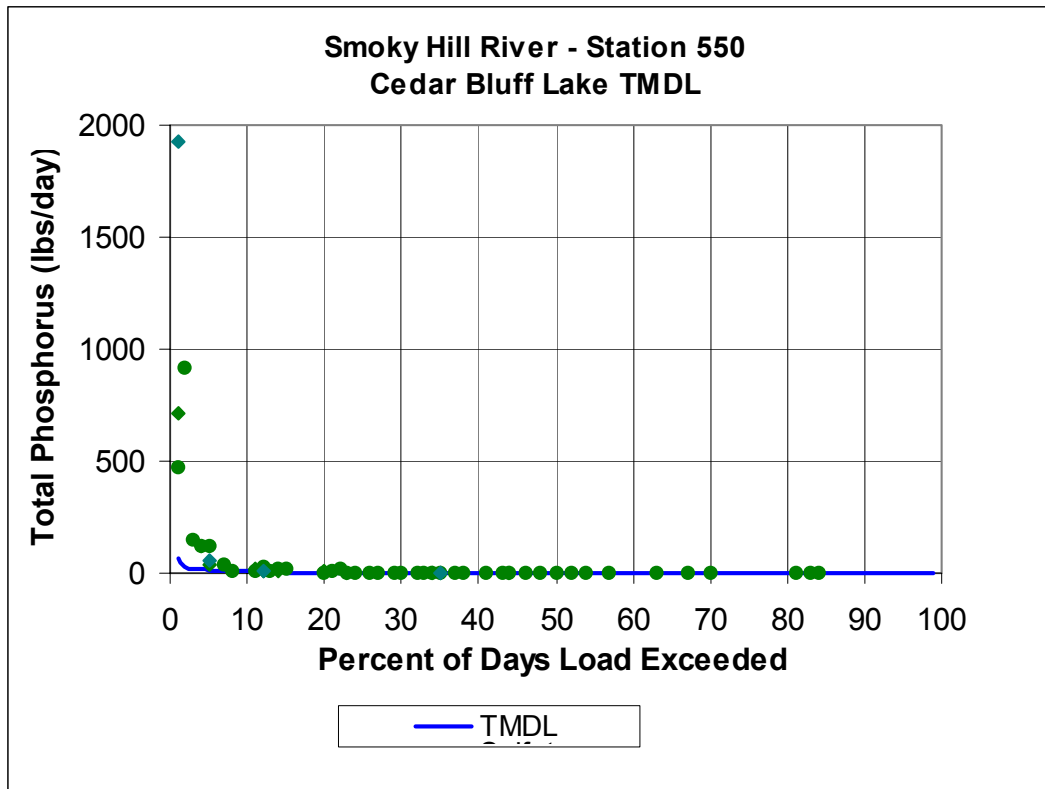


The Trophic State Index plots indicate that zooplankton grazing is the primary limiting factor. This is inferred by examining the relationship between the $TSI(SD) - TSI(Chl)$ and $TSI(TP) - TSI(Chl)$ or $TSI(TN) - TSI(Chl)$. The deviation of chlorophyll from the sediment load indicates the degree of light penetration, while the difference between chlorophyll and phosphorus, or chlorophyll and nitrogen indicates the level of phosphorus or nitrogen limitation. Therefore, if the final plot is in the fourth quadrant, it shows that the transparency of the water is impaired due to the presence of large particles, such as blue-green algae, and that phosphorus and nitrogen do not limit algae growth.

Appendix C - Monthly Elevations



Appendix D - Load Reduction Curves



Appendix E - Input for CNET Model

Parameter	Value Input into CNET Model
Drainage Area (km ²)	11974
Precipitation (m/yr)	0.53
Evaporation (m/yr)	1.63
Unit Runoff (m/yr)	0.02
Surface Area (km ²)	26.8
Mean Depth (m)	7.8
Depth of Mixed Layer (m)	6.0
Depth of Hypolimnion (m)	2.0
Observed Phosphorus (ppb)	44.0
Observed Chlorophyll-a (ppb)	7.5
Observed Secchi Disc Depth (m)	1.8

Output from CNET Model

Parameter	Output from CNET Model
Load Capacity (LC)*	320,052 lb/yr
Waste Load Allocation (WLA)	4,266 lb/yr
Load Allocation (LA)	283,781 lb/yr
Margin of Safety (MOS)	32,005 lb/yr

*LC = WLA + LA + MOS

Approved Sep. 30, 2003